Ky., Mich., Minn., Mo., Nebr., Nev., N. Mex., Ohio, Tex., Utah, Wis. 27th, Colo., Ga., Ill., Ind., Iowa, Kans., Ky., Md., Mass., Minn., Mo., Mont., Nebr., Nev., N. Y., Ohio, Pa., Tenn., Utah, Va., W. Va., Wis. 28th, Ala., Ariz., Colo., Conn., D. C., Ga., Ill., Ind., Iowa, Ky., Md., Mass., Mich., Mo., Nev., Ohio, Pa., R. I., Tenn., Utah, Va., W. Va., Wis. 29th, Colo., Conn., Ky., Mass., Mich., Nev., N. H., N. Mex., N. Y., Pa., Utah, Vt., Wis. 30th, Colo., Nev., N. H., Tenn., Vt.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for September, 1889, as determined from the reports of nearly 2,000 stations, is exhibited on chart iii. • In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for each Signal Service station. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean when the precipitation is below the normal and subtracting when above.

In September, 1889, the precipitation was greatest in areas in southern Florida, south-central Indian Territory and the adjoining part of north-central Texas, southeastern Kansas, central Kentucky, central New Jersey, southeastern Pennsylvania, eastern Texas, and central Virginia, where it exceeded ten inches, the greatest amount reported, 16.71 inches, being noted at Lehigh, Ind. T. At stations in western Arizona, a greater part of California, west-central Kansas, east-central Mississippi, western Nebraska, western Nevada, south-central Oregon, and northwestern Utah no rainfall was recorded. The following are the greatest and least rainfalls respectively reported in the several states and territories: Alabama, 9.23, at Decatur; 0.57, at Livingston. Arizona, 5.90, at Globe; 0.00, at western stations. Arkansas, 8.08, at Ozone; 0.21, at Pine Bluff. California, 1.52, at Crescent City; 0.00 at a majority of stations. Colorado, 1.48, at La Veta; 0.06, at Las Animas. Connecticut, 7.60, at Voluntown; 2.87, at Vernon Centre. Dakota, 6.25, at Alexandria; 0.37, at Onida and Rapid City. District of Columbia, 4.48, at Washington Barracks; 3.88, at Washington City. Florida, 13.87, at Key West; 0.95, at Micco. Georgia, 8.97, at Toccoa; 1.19, at Fort Gaines. Idaho, 1.06, at Soda Springs; trace, at Era. Illinois, 5.66, at Flora; 1.66, at Winnebago. Indiana, 8.90, at Huntingburgh; 1.39, at Point Isabel. Indian Territory, 16.71, at Lehigh; 1.97, at Fort Supply. Iowa, 7.19, at Washington; 0.70, at Wesley. Kansas, 10.59, at Sedan; 0.00, at several central stations. Kentucky, 12.40, at South Fork; 2.47, at Mount Sterling. Louisiana, 6.80, at Houma; 0.33, at Alexandria. Maine, 6.52, at Mayfield; 0.21, at Kennebec Arsenal. Maryland, 8.65, at Fallston; 3.79, at Barren Creek Springs. Massachusetts, 5.35, at Clinton; 2.20, at Provincetown. Michigan, 5.60, at Sault de Ste. Marie, 0.35, at Highland Station. Minnesota, 6.27, at Moorhead; 0.51, at Saint Paul. Mississippi, 6.60, at Holly Springs; 0.00, at Kosciusko. Missouri, 9.28, at Glasgow; 0.28, at Jerome. Montana, 2.95, at Glendive; 0.06, at Custer. Nebraska, 3.72, at Marquette; 0.00, at Fort Sydney. Nevada, 2.00, at Pioche; 0.00, at western stations. New Hampshire, 7.01, at Mount Washington, and 6.29, at Belmont; 2.92, at Pennichuck Station. New Jersey, 13.13, at Plainfield; 3.17, at Atlantic City. New Mexico, 3.93, at Hillsborough; 0.18, at Albuquerque. New York, 8.21, at Fort Schuyler; 1.82, at Alfred Centre. North Carolina, 5.30, at Lenoir; 0.35, at Grover. Ohio, 7.12, at Georgetown; 0.52, at Toledo. Oregon, 7.51, at Tillamook; 0.00, at south-central stations. Pennsylvania, 10.01, at Kennett Square; 1.88, at Mahoning. Rhode Island, 5.52, at Kingston; 3.41, at Block Island. South Carolina, 5.56, at Greenville; 1.46, at Florence. Tennessee, 9.91, at Clinton; 2.06, at Greeneville. Texas, 15.43, at Gainesville; 0.45, at Epworth and Panhandle. Utah, 1.26, at Saint George; 0.00, at extreme northwest stations. Vermont, 6.30, at East Berkshire; 3.05, at Jacksonville. Virginia, 10.69, at Lynchburgh; 3.07, at Woodstock. Washington Territory, 5.69, at Neah Bay; 0.26, at Fort Walla Walla. West Virginia, 5.94, at Harper's Ferry; 0.69, at Ella. Wisconsin, 4.79, at Fond du Lac; 0.25, at Honey Creek. Wyoming, 0.59, at Camp Sheridan; 0.00, at Fort Laramie.

The precipitation for September, 1889, was above the normal in the Saint Lawrence Valley, southern and western New England, the middle Atlantic states, Florida (south of the thirtieth parallel), northern Georgia, Alabama, extreme southern Louisiana, the Ohio valley and Tennessee, except at Memphis, Tenn., at eastern Lake Erie stations, from northern Minnesota and northeastern Dakota south-southwest over central Nebraska, at stations in central and extreme southeastern Arizona, and extreme western Texas, in west-central and southwestern Washington Territory, and at Los Angeles, Cal.; elsewhere the precipitation was below the average for the month. The most marked departures above the normal were reported in south-central Virginia and extreme southern Florida, where they exceeded seven inches. In the middle Saint Lawrence valley the rainfall exceeded the normal amount by more than five inches, while in extreme southeastern New York, southeastern Tennessee, and the upper valley of the Red River of the North the excess was more than four inches. The greatest departures below the normal precipitation occurred on the south Atlantic coast, in west-central Mississippi, and thence southwestward to the middle west Gulf coast, where they were more than three inches. In districts where the precipitation was in excess the average percentages of the normal were about as follows: New England, 117 per cent.; middle Atlantic states, 143 per cent.; Florida Peninsula, 170 per cent.; east Gulf states, 114 per cent.: west Gulf states, 109 per cent.; Ohio valley and Tennessee, 160 per cent.; extreme Northwest, 165 per cent.; Missouri Valley, 113 per cent.; southeastern slope of the Rocky Mountains, 108 per cent.; south Pacific coast, 567 per cent. In districts where the precipitation was deficient the average percentages of the normal were about as follows: south Atlantic states, 67 per cent.; Rio Grande Valley, 78 per cent.; lower lake region, 84 per cent.; upper lake region, 83 per cent.; upper Mississippi valley, 83 per cent.; northeastern slope of the Rocky Mountains, 75 per cent.; middle eastern slope of the Rocky Mountains, 80 per cent; southern plateau, 93 per cent.; middle plateau, 58 per cent.; northern plateau, 14 per cent.; north Pacific coast, 93 per cent., and middle Pacific coast, 1 per cent. The remarkable percentage of the normal rainfall noted on the south Pacific coast for the current month was due to a monthly rainfall of 0.34 inch at Los Angeles, Cal., where the normal precipitation for September is but .03 inch, and the very low percentage of the normal on the middle Pacific coast was occasioned by an entire absence of measurable rainfall during the month at the stations for which the normal precipitation has been determined.

In the following-named districts the rainfall for August, 1889, was excessive, while for the current month it was deficient: Rio Grande Valley, middle eastern slope of the Rocky Mountains, and the north and middle Pacific coasts. In New England, the middle Atlantic states, the east and west Gulf states, Ohio valley and Tennessee, extreme Northwest, southeastern slope of the Rocky Mountains, and the south Pacific coast there was a deficiency in August and an excess of rainfall in September, 1889. In the Florida peninsula there was an excess for the current and the preceding month, while in the south Atlantic states, the Lake regions, upper Mississippi valley, northeastern slope of the Rocky Mountains, and the

plateau regions there was a deficiency in August, 1889, and in the current month.

DEVIATIONS FROM AVERAGE PRECIPITATION.

The following table shows for certain stations, as reported by voluntary observers, (1) the average precipitation for September for a series of years; (2) the length of record during which the observations have been taken and from which the average has been computed; (3) the total precipitation for September, 1889; (4) the departure of the current month from the average; (5) and the extreme monthly precipitation for September during the period of observation and the years of occurrence:

State and station.	County.	(1) Average for the month of Sept.	(2) Length of record.	(3) Total for Sept., 1889.	(4) Departure from average.	(5) Extreme monthly precipitation for September.			
						Greatest.		Least.	
						Am't.	Year.	Am't.	Year.
Arkansas.		*Inches*	*Years*	*Inches*	*Inches.*	*Inches*		*Inches.*	
Lead Hill	Boone	4.11	8	4.33	+0.22	8.44	1886	0.48	1888
California.									
Sacramento	Sacramento	0.12	40	0.00	−0.12	1.00	1851	0.00	*
Colorado.									
Fort Lyon	Bent	0.99	20	0.09	−0.90	4.72	1870	0.04	'67,'88
Connecticut.									
Middletown	Middlesex	3.34	31	4.72	+1.38	11.64	1882	0.49	1881
Florida.									
Merritt's Island	Brevard	8.42	11	3.83	−4.59	23.78	1878	2.88	1883
Georgia.									
Forsyth	Monroe	3.47	15	3.70	+0.23	8.69	1888	0.10	1886
Illinois.									
Peoria	Peoria	3.54	33	2.61	−0.93	9.63	1875	0.60	1867
Riley	McHenry	3.74	38	1.68	−2.06	8.89	1872	0.21	1877
Indiana.									
Logansport	Cass	3.50	13	3.13	−0.37	6.66	1859	0.24	1882
Vevay	Switzerland	3.38	24	5.19	+1.81	15.25	1866	0.47	1871
Iowa.									
Cresco	Howard	4.24	16	2.87	−1.37	10.03	1881	0.82	1888
Monticello	Jones	4.08	34	2.62	−1.46	10.15	1881	0.00	1871
Logan	Harrison	3.61	23	1.32	−2.29	9.90	1870	0.20	1882
Kansas.									
Lawrence	Douglas	3.29	24	5.02	+1.73	9.15	1884	0.23	1888
Wellington	Sumner	3.80	10	3.77	−0.03	11.19	1881	1.10	1884
Louisiana.									
Grand Coteau	St. Landry	3.86	6	2.13	−1.73	10.58	1885	0.37	1888
Maine.									
Gardiner	Kennebec	3.18	49	2.55	−0.63	8.24	1868	0.84	1865
Maryland.									
Cumberland	Allegany	2.68	18	4.16	+1.48	8.50	1882	0.40	1873
Massachusetts.									
Amherst	Hampshire	3.37	54	4.26	+0.89	11.85	1882	0.37	1865
Newburyport	Essex	3.22	10	2.82	−0.40	8.47	1888	0.87	1884
Somerset	Bristol	2.89	17	3.74	+0.85	7.27	1888	0.94	1884
Michigan.									
Kalamazoo	Kalamazoo	3.38	13	1.90	−1.48	6.28	1879	0.53	1882
Thornville	Lapeer	2.95	12	1.56	−1.39	5.25	1879	0.95	1882
Minnesota.									
Minneapolis	Hennepin	3.70	23	0.82	−2.88	11.45	1869	0.15	1882
Montana.									
Fort Shaw	Lewis&Clarke	0.83	20	0.35	−0.48	4.79	1882	0.00	'75,'79
New Hampshire.									
Hanover	Grafton	2.98	48	3.52	+0.54	7.03	1840	0.27	1884
New Jersey.									
Moorestown	Burlington	3.73	26	6.10	+2.37	11.71	1882	0.16	1884
South Orange	Essex	3.68	19	12.39	+8.71	14.45	1882	0.15	1884
New York.									
Cooperstown	Otsego	3.23	35	3.87	+0.64	5.79	1876	1.17	1871
Palermo	Oswego	3.20	35	2.70	−0.50	7.30	1866	1.04	1880
North Carolina.									
Lenoir	Caldwell	3.94	17	5.30	+1.36	8.50	1878	0.40	1871
Ohio.									
N. Lewisburgh	Champaign	3.15	17	3.75	+0.60	7.60	1884	0.75	1872
Wauseon	Fulton	2.38	17	0.79	−1.59	5.29	1879	0.55	1871
Oregon.									
Albany	Linn	1.89	11	1.74	−0.15	5.61	1884	0.41	1882
Eola	Polk	1.62	19	1.80	+0.18	6.57	1884	0.00	1873
Pennsylvania.									
Dyberry	Wayne	2.71	20	4.18	+1.47	6.49	1888	1.04	1885
Grampian Hills	Clearfield	3.28	18	2.76	−0.52	6.36	1868	1.14	1885
Wellsborough	Tioga	3.55	10	2.71	−0.84	8.40	1880	1.75	1888
South Carolina.									
Statesburgh	Sumter	3.66	8	3.23	−0.43	6.67	1884	0.75	1887
Tennessee.									
Austin	Wilson	3.77	19	3.59	−0.18	10.20	1868	1.51	1884
Milan	Gibson	2.76	7	4.85	+2.09	4.95	1884	0.64	1888
Texas.									
New Ulm	Austin	5.46	17	4.35	−1.11	15.08	1874	0.90	1872
Vermont.									
Strafford	Orange	3.58	16	5.00	+1.42	6.30	1880	0.70	1884
Virginia.									
Bird's Nest	Northampton	3.20	20	6.70	+3.50	7.70	1876	0.00	1884
Wytheville	Wythe	3.84	24	3.35	−0.49	12.20	1888	0.30	1862
Wisconsin.									
Madison	Dane	3.41	19	1.93	−1.48	8.17	1881	0.47	1871
Washington.									
Fort Townsend	Jefferson	1.35	14	0.75	−0.60	5.79	1874	0.16	1882

*Frequently.

Table of excessive precipitation, September, 1889.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Alabama.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Auburn		2.70	23			
Citronelle		4.05	22			
Columbiana		3.12	23			
Decatur (1)		2.61	4			
Do		2.80	5			
Decatur (2)		3.30	3			
Evergreen		2.80	23			
Mobile		2.72	22-23			
Montgomery		3.17	23	1.78	1 00	23
Mount Vernon Barracks		4.10	22-23			
Mount Willing		2.60	23			
Selma (2)		3.00	23			
Valley Head		2.60	23			
Wiggins		2.97	23			
Arizona.						
Globe		2.97	7	2.97	2 55	7
Whipple Barracks (Prescott)				1.16	0 30	6
Arkansas.						
Fort Smith		2.68	4-5			
Fulton		2.57	8			
Connecticut.						
Voluntown		2.54	13			
Dakota.						
Alexandria		3.00	13			
Canton		4.22	13-14			
Davenport		2.55	13			
Webster		3.49	13-14			
Florida.						
Alva	10.51	2.68	17			
Altamonte Springs		3.72	18			
Fort Barrancas		3.78	22-23			
Homeland		3.50	25	3.50	3 00	25
Jacksonville		4.39	23	3.25	1 10	23
Key West	13.87	7.90	21-22			
Lake City		3.00	6			
Do		4.22	23			
Live Oak		4.50	23			
Villa City		4.00	18			
Georgia.						
Atlanta		3.43	23-24			
Athens (1)		2.80	23			
Columbus		3.50	23			
Forsyth		2.50	23			
Fort McPherson		4.00	23			
Gainesville		2.70	24			
Marietta		3.93	23			
Milledgeville				2.02	2 00	23
Point Peter		2.80	23			
Savannah				1.10	0 42	1
Do				1.10	0 45	6
Toccoa		3.00	17			
Do		2.68	24			
Illinois.						
Aurora		3.51	4-5			
Beason		3.00	5			
Lanark		3.08	4			
Louisville		3.40	4			
Oswego		2.71	4			
Pana		3.00	4-5			
Indiana.						
Evansville		2.65	5			
Huntingburgh		5.00	4			
Princeton		3.30	4			
Rockville		2.50	4-5			
Scalesville		3.58	4			
Vincennes		3.06	4			
Indian Territory.						
Lehigh	16.71	3.29	9			
Do		3.31	10			
Do		5.05	11			
Iowa.						
Mount Pleasant		3.00	11-12			
Washington		4.91	11-12			
Kansas.						
Arlington		2.50	14			
Cold Water		3.00	14			
Emporia		4.05	8			
Independence		5.08	10-11			
Leavenworth				1.05	1 00	14
Marmaton		3.80	11			
Sedan	10.59	7.52	10-11			
Winfield		2.50	21			
Kentucky.						
Burnside		2.57	6			
Murray		3.31	2			
South Fork	12.40	2.90	5-6			
Do		7.50	17-18			
Louisiana.						
Edgard		3.20	25			
Houma		5.33	25	3.60	1 00	25
New Orleans				1.39	0 30	25
Minnesota.						
Duluth		2.94	13-14			
Moorhead		4.30	12-13			
Mississippi.						
Holly Springs		2.80	5			
Loch Leven		3.60	6			
Meridian		3.26	5	1.60	0 40	5
Do				1.60	1 00	5

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Missouri.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
Frankford (1)		3.18	11-12			
Glasgow		2.56	2-3			
Do		2.91	12			
Grand Pass				1.95	1 00	2
Hermann		3.05	5			
Kansas City		2.81	11			
Saint Louis				1.00	1 00	4
Shelbina		2.50	11			
Warrensburgh		2.70	10			
Nebraska.						
Creighton		2.85	13-14			
North Platte				1.25	1 10	21
New Jersey.						
Egg Harbor City	10.73	2.86	12			
Freehold	10.63	4.06	12			
Gillette		3.65	17-18			
Hopewell	10.90	3.20	14			
Imlaystown	11.29	2.97	13			
Lambertville	10.84	3.18	15	3.18	2 00	15
Newark		3.01	17			
Plainfield	13.13	3.70	17			
Tenafly	11.31					
Trenton	10.13	2.57	13			
New York.						
Boyd's Corners		2.57	17-18			
Fort Schuyler		2.70	12			
Nineveh		3.75	16-18			
Setauket		3.42	12			
South Kortright		3.18	22			
Tannersville		2.75	11			
West Point				1.50	1 15	6
North Carolina.						
Hatteras		3.59	18	1.08	0 34	18
Ohio.						
Oberlin		3.42	15-16			
Oregon.						
Tillamook		2.56	30			
Pennsylvania.						
Coatesville		3.13	17			
Doylestown		3.00	18			
Drifton		3.42	14			
Kennett Square	10.01					
Lancaster		2.68	16-17			
Lansdale		2.90	18			
Pottstown		3.40	17	3.40	2 30	17
Quakertown		3.40	17			
Seisholtzville		2.74	18			
South Carolina.						
Conway		3.85	23-24			
Greenville		2.50	24			
Hardeeville		2.55	1			
Port Royal		2.55	1			
Statesburgh		2.74	23-24			
Tennessee.						
Andersonville		4.58	16			
Bolivar		2.80	2			
Do		2.50	5			
Charleston		3.34	6			
Chattanooga		2.87	5			
Clinton		3.55	16			
Dunlap		3.21	17			
Dyersburgh		2.84	5			
Grand Junction		4.46	5			
Grief		4.00	5			
Hohenwald		2.62	17			
Johnsonville		2.50	5			
Kingston		2.55	7			
Kingston Springs		3.75	16			
Do		2.56	5			
Knoxville		2.77	16-17			
Loudon		4.20	16			
McKenzie		3.00	4			
Nunnelly		4.20	5			
Rockwood		2.75	17			
Rugby		3.31	17			
Springdale		3.65	17			
Trenton		3.44	5			
Texas.						
Austin		2.75	3			
Brazoria		3.70	2-3			
Do		2.79	4			
Brownsville		5.15	2	1.49	1 00	2
College Station	14.86	7.84	4			
Corpus Christi	12.69	3.20	2-3			
Do		3.72	27-28			
Cuero		3.00	3			
Decatur		4.13	9-10			
Forestburgh	12.25	5.19	8	5.19	3 50	8
Fort Brown		4.80	2			
Fort Elliott				1.42	1 00	14
Fort McIntosh		3.65	5-6	2.20	2 00	25
Gainesville	15.43	5.00	4-5			
Do		2.50	8			
Do		5.50	9-10			
Gallinas		3.41	3			
Graham	10.74	2.65	9			
Granbury		2.87	9			
Howe	10.05	4.15	10	3.00	0 20	10
La Grange		3.04	3			
Luling		3.35	3			

Table of excessive precipitation—Continued.

State and station.	Monthly rainfall 10 inches, or more.	Rainfall 2.50 inches, or more, in 24 hours.		Rainfall of 1 inch, or more, in one hour.		
		Amt.	Day.	Amt.	Time.	Day.
Texas—Continued.	*Inches.*	*Inches.*		*Inches*	*h. m.*	
New Braunfels		2.65	3			
Do		3.90	15			
Paris		3.50	4			
Snyder		3.40	9			
Virginia.						
Bolar		3.30	6-7			
Do		4.20	23-24			
Lynchburgh	10.69	3.75	14-15			
Do		2.89	24			
Petersburgh		2.95	24-25			
Washington.						
Blakely		2.80	30			
Wisconsin.						
Fond du Lac		3.48	4			
Green Bay		3.30	4			
La Crosse				1.09	0 42	23
Mexico.						
Guanajuato	11.88	2.52	24			
La Logia		4.42	1	4.42	2 00	1
Do		3.25	16	3.25	3 00	16
Leon de Aldemas	12.94					
Topolobampo	10.31	3.74	1			
Do		4.43	15-16			

Excessive precipitation for August, 1889, received too late for publication.

Pennsylvania.						
Catawissa		2.75	14			
Drifton		3.42	14			
Doylestown		2.56	14			
Frederick		2.67	14			
Girardville		4.03	14			
Point Pleasant		2.53	14			
Pottstown		2.50	14			
Smith's Corner		2.64	14			

EXCESSIVE PRECIPITATION.

Monthly precipitation to equal or exceed ten inches was reported at six stations in Texas; at two stations in Florida, and at one station each in Kansas, Indian Territory, and Kentucky. In states and territories other than those named precipitation to equal or exceed ten inches was not reported for September, 1889. The heaviest rainfall in the states named was 15.43 at Gainesville, Tex.; 13.87 at Key West, Fla.; 10.59 at Sedan, Kans.; 16.71 at Lehigh, Ind. T., and 12.40 at South Fork, Ky. In September of preceding years rainfall to equal or exceed ten inches has occurred most frequently in Florida, where it was reported for twenty-nine years; in Texas for fifteen years; in North Carolina for eleven years; in Alabama, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Massachusetts, Mississippi, Nebraska, New Hampshire, New Jersey, New York, Pennsylvania, South Carolina, and Virginia for from five to ten years, inclusive; and in Arizona, Connecticut, Delaware, District of Columbia, Kentucky, Michigan, Minnesota, Missouri, Ohio, Oregon, Tennessee, Vermont, Washington Territory, and Wisconsin for from one to four years, inclusive. In states and territories other than those named monthly precipitation to equal or exceed ten inches has not been reported for September in preceding years. Among the heavier rainfalls recorded for September are: 23.78, at Merritt's Island, Fla.; 25.10, at Biscayne, Fla., and 21.12, at Jacksonville, Fla., in 1878; 22.10, at Fort Myers, Fla., in 1854; 23.90, at Saint Augustine, Fla., in 1871; 23.24, at Mayport, Fla., in 1885; 22.08, at Brunswick, Ga., and 27.41, at Saint Mary's, Ga., in 1885; 25.98, at Paterson, N. J., in 1882; 21.97, at Sing Sing, N. Y., in 1868; 26.50, at Elsworth, N. C., in 1881; 20.10, at Wilmington, N. C., in 1877; 20.44, at Spartanburgh, S. C., in 1888; 30.57, at Brownsville, Tex., in 1886, and 26.01, at Galveston, Tex., in 1885. Exclusive of the instances and years cited, monthly rainfall to equal or exceed 15.00 inches has been reported for September for four years in Texas; for three years in Louisiana; for two years in Indiana, New Hampshire, and North Carolina, and for one year in Delaware, Florida, Georgia, Iowa, Minnesota, New York, Ohio, Oregon, South Carolina, and Virginia.

Precipitation to equal or exceed 2.50 inches in twenty-four hours was reported at the greatest number of stations, twenty-one, in Tennessee; at twenty in Texas; at twelve in Alabama; at nine in Florida, Georgia, and New Jersey; at eight in Pennsylvania; at seven in Kansas; at six in Illinois, Indiana, Missouri, and New York; at five in South Carolina; at four in Dakota; at three in Kentucky, Mississippi, and Virginia; at two in Arkansas, Iowa, Louisiana, Minnesota, and Wisconsin; and at one each in Arizona, Connecticut, Indian Territory, Nebraska, North Carolina, Ohio, Oregon, and Washington Territory. In states and territories other than those named precipitation to equal or exceed 2.50 inches in twenty-four hours was not reported for September, 1889. Among the heavier rainfalls reported for this period for the month were: 7.90, at Key West, Fla., 21st–22d; 5.00, at Huntingburgh, Tex., 4th; 5.05, at Lehigh, Ind. T., 11th; 7.52, at Sedan, Kans., 10–11th; 7.50, at South Fork, Ky., 17–18th; 5.33, at Houma, La., 25th, and 7.84, at College Station, Tex., 4th.

Rainfall to equal or exceed 2.50 inches in twenty-four hours in September has been most frequently reported in Texas, where it has been noted for eighteen years; in North Carolina for seventeen years; in Florida for fourteen years; in Georgia, Kansas, Mississippi, and South Carolina for thirteen years; in Missouri for twelve years; in Illinois, Iowa, Michigan, and Ohio for eleven years; in Alabama, Arkansas, Connecticut, Dakota, Kentucky, Louisiana, Maryland, Minnesota, Nebraska, New Jersey, New York, Pennsylvania, Tennessee, Virginia, and Wisconsin for from five to ten years, inclusive, and in Arizona, California, Colorado, Delaware, District of Columbia, Indiana, Indian Territory, Maine, Massachusetts, Montana, New Hampshire, New Mexico, Oregon, Rhode Island, Vermont, and West Virginia for from one to four years, inclusive. In states and territories other than those named rainfall to equal or exceed 2.50 inches in twenty-four hours has not been reported for September in preceding years. Among the heavier daily rainfalls reported for September are: 7.00, Mobile, Ala., 18th, 1877; 9.52, Mayport, Fla., 21st, 1885; 9.09, Merritt's Island, Fla., 9th, 1878; 7.04, Merritt's Island, Fla., 10th, 1878; 7.82, Jesup, Ga., 27th, 1885; 8.22, Nashua, Iowa, 25th, 1880; 7.00, Fort Hays, Kans., 12th, 1871; 7.00, Shreveport, La., 17th, 1875; 10.60, Genoa, Nebr., 1st, 1887; 7.41, Mount Washington, N. H., 15th, 1880; 8.00, Lambertville, N. J., 2d, 1850; 7.50, South Orange, N. J., 23d, 1882; 7.00, Portsmouth, N. C., 12th, 1884; 7.30, Wilmington, N. C., 10th, 1880; 7.40, Abbeville, S. C., 10th, 1888; 8.35, Greenwood, S. C., 10th, 1888; 8.50, Brownsville, Tex., 21st, 1887; 7.02, Wytheville, Va., 12th, 1878. At Fort Delaware, Del., 10.70 inches fell on the 3d and 4th, 1868; at Paterson, N. J., 17.90 on the 21st and 22d, 1882; and at Elsworth, N. C., 13.00 on the 15th and 16th, 1881. Exclusive of the instances and years cited, daily rainfall to equal or exceed 5.00 inches has been reported in North Carolina and Texas for six years; in Florida and Georgia for four years; in Mississippi for two years; and in Alabama, Arkansas, Kansas, Louisiana, Massachusetts, Missouri, Ohio, Pennsylvania, and Wisconsin for one year.

Rainfall to equal or exceed one inch in one hour was reported on five dates in Texas; on three dates in Georgia; on two dates in Arizona, Florida, and Missouri; and on one date each in Alabama, Kansas, Louisiana, Mississippi, Nebraska, New Jersey, New York, North Carolina, Pennsylvania, and Wisconsin; in states and territories other than those named, rainfall to equal or exceed one inch in one hour was not reported for September, 1889. Among the heavier rainfalls reported for one hour or less were: 1.16 in thirty minutes, at Whipple Barracks (Prescott), Ariz., 6th; 3.25 in one hour and ten minutes, at Jacksonville, Fla., 23d; 3.60 in one hour, at Houma, La., 25th; 1.60 in forty minutes, at Meridian, Miss, 5th; and 3.00 in twenty minutes, at Howe, Tex., 10th. In September of preceding years rainfall to equal one inch per hour has been most frequently reported in Texas, where it has been noted for twelve years; in Florida, Georgia, Illinois, Kansas, Nebraska, and North Carolina for from five to ten years, inclusive; and in Alabama, Arizona, Arkansas, Dakota, District of Columbia, Indiana, Indian Territory, Iowa, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, South Carolina, Tennessee, Vermont, Virginia, and West Virginia for from one to four years, inclusive. In states and territories other than those named, rainfall to equal one inch an hour has not been reported for September in preceding years. Among the heavier rainfalls reported for one hour or less in September are: for eight minutes, 0.45, at New York City, 21st, 1882. For eleven minutes, 1.05, at Alpena, Mich., 10th, 1884. For fifteen minutes, 1.00, at Omaha, Nebr., 28th, 1881. For twenty minutes, 1.07, at Fort Riley, Kans., 15th, 1870. For twenty-five minutes, 1.23, at Washington, D. C., 16th, 1888; 1.20 at Philadelphia, Pa., 21st, 1882; 1.27 at Indianola, Tex., 7th, 1880. For twenty-seven minutes, 1.45, at Cairo, Ill., 13th, 1871. For thirty minutes, 1.70, at Cedar Keys, Fla., 2d, 1888; 1.40, at Mount Sterling, Ill., 1st, 1886; 2.00 at Charleston, S. C., 13th, 1887. For thirty-three minutes, 1.50, at Jacksonville, Fla., 5th, 1873. For thirty-five minutes, 1.64, at Fort Barrancas, Fla., 23d, 1878; 1.93 at Rio Grande City, Tex., 26th, 1879. For forty-five minutes, 2.42, at Fort Davis, Tex., 9th, 1880. For one hour, 3.00, at Saint Louis, Mo., 19th, 1849.

MAXIMUM RAINFALLS IN ONE HOUR OR LESS.

The following table is a record of the heaviest rainfalls during September, 1889, for periods of five and ten minutes and one hour, as reported by regular stations of the Signal Service furnished with self-registering gauges:

Station.	Maximum fall in—					
	5 min.	Date.	10 min.	Date.	1 hour.	Date.
	Inch.		*Inch.*		*Inch.*	
Boston, Mass	0.11	18	0.20	18	0.55	16
Cincinnati, Ohio	0.15	15	0.20	15	0.45	16
Chicago, Ill	0.13	4	0.25	4	0.50	4
Detroit, Mich	0.15	15	0.15	15	0.20	15
Dodge City, Kans	0.07	7	0.11	7	0.27	7, 13, 14
Jupiter, Fla	0.25	19	0.40	19	0.75	19
Marquette, Mich	0.07	23	0.10	23	0.35	23
New York City	0.23	17	0.30	17	0.35	12
Savannah, Ga	0.33	6	0.60	6	1.10	6
San Francisco, Cal					T.*	
Saint Louis, Mo	0.23	4	0.45	4	1.00	4
Washington City	0.09	17	0.10	16, 17	0.35	17

* Fog, total for month.

The table shows that the greatest rate per minute for a five minute period was .066 of an inch at Savannah, Ga., on the 6th. The rate per minute for this period at the other stations given was, .05 at Jupiter, Fla., on the 19th; .046 at New York City, 17th, and at Saint Louis, Mo., 4th; .03 at Cincinnati, Ohio, and Detroit, Mich., 15th; .026 at Chicago, Ill., on the 4th; .022 at Boston, Mass., on the 18th; .018 at Washington City, on the 17th; .014 at Dodge City, Kans., 7th, and at Marquette, Mich., 23d. The greatest rate per minute for a ten minute period was .06, at Savannah, Ga., on the 6th. At Saint Louis, Mo., the rate per minute for this period was .045, on the 4th; at Jupiter, Fla., .04, on the 19th; at New York City, .03, on the 17th; at Chicago, Ill., .025, on the 4th; at Boston, Mass., .02, on the 18th; at Cincinnati, Ohio, .02 on the 15th; at Detroit, Mich., .015, on the 15th; at Dodge City, Kans., .011, on the 7th; at Marquette, Mich., .01, on the 23d, and at Washington City, .01, on the 16th and 17th. The only rainfalls to equal or exceed one inch an hour are 1.10, at Savannah, Ga., on the 6th, and 1.00, at Saint Louis, Mo., on the 4th.

SNOW (snowfall in inches and tenths).

Snow fell in measurable quantities as far south as extreme northern Texas, where three inches were reported at Folsom on the 23d. The greatest depth of snowfall for the month, 10.4 inches, was noted at Mount Washington, N. H., where snow fell on the 19th to 22d, 27th, 29th, and 30th. In central Colorada 9.1 inches fell at La Veta on the 24th; 4.00 inches at Palmer Lake on the 23d and 24th, and 2.8 inches at Lead-

ville (no date given); elsewhere the snowfalls reported were less than one inch. The following is a record, by dates, of the occurrence of snow in the several states and territories: 12th: Saint Vincent, Minn., trace. 14th: Cheyenne, Wyo., 0.7, and Fort Laramie, Wyo., trace. 17th: Lansing, Mich., trace. 19th: Mount Washington, N. H., 4.6; Philipsburgh, Pa., trace; Mount Killington, Vt., trace. 20th: Mount Washington, N. H., 1.3. 21st: Mount Washington, N. H., 1.5; Mount Killington, Vt., trace; Blue Knob, Pa., 0.5; Virginia City, Mont., trace; Wausau, Wis., trace. 22d: Mount Washington, N. H., 0.5; Virginia City, Mont., trace. 23d: Colorado Springs, Colo., 0.1; Denver, Colo., trace; Coulter, Colo., 0.5. (14th and 23d); Cresco, Iowa, trace; Virginia City, Mont., trace; Folsom, Tex., 3.00. 23d–24th: Palmer Lake, Colo., 4.0; Taylor's Ranch, Utah, trace. 24th: La Veta, Colo., 9.1; Fort Logan, Mont., 0.5; Santa Fé, N. Mex., trace; Fort Washakie, Wyo., trace. 25th: Hayward, Wis., trace. 26th: Marquette, Mich., trace; Grand Meadow, Sheldon, and Saint Paul, Minn., trace; Viroqua, La Cross, and Grantsburgh, Wis., trace. 27th: Mount Washington, N. H., 0.5; Mount Killington, Vt., 0.5; Sault de Ste. Marie, Mich., trace. 28th: Mount Killington, Vt., trace. 29th: Mount Washington, N. H., 0.8; Constableville and Number Four, N. Y., trace. 30th: Mount Washington, N. H., 0.2.

The only report of unmelted snow on the ground at the end of the month was trace, at Mount Washington, N. H.

HAIL.

The more severe hail-storms of the month are noted under "Local storms." Hail was reported during the month as follows: 1st, Pa. 2d, Ariz. 3d, Mo. 4th, Dak., Wis. 6th, Ariz. 7th, Ariz., Kans. 9th, 11th, 12th, Dak. 14th, Colo. 15th, Dak., Ind., N. J., Utah. 16th, N. Y. 17th, Mich. 18th, Ariz., Dak., Ohio. 19th, N. Y., Pa. 20th, Ariz., Colo. 21st, Conn., Kans., Nebr., Pa., R. I. 22d, Dak. 23d, Utah, Wis. 24th, Kans., Pa. 25th, Ariz., Mich. 26th, Iowa, Mich., Minn. 27th, Mich., N. H., N. Y., Vt. 28th, Me., N. J., N. Y., Vt. 30th, Mich., N. J.

SLEET.

Sleet was reported as follows: 12th, Dak. 13th, Mont. 14th, Cal. 21st, Pa. 24th, Dak. 26th, Minn.

WINDS.

The prevailing winds during September, 1889 are shown on chart ii by arrows flying with the wind. In New England, and over the southern plateau region, south to west winds were most frequently noted, except on the south New England coast, where they were from north to east; in the middle and south Atlantic states, the east and west Gulf states, the Ohio valley and Tennessee, the upper Mississippi valley, the middle eastern slope of the Rocky Mountains, and on the north Pacific coast the winds were variable, except along the middle Atlantic coast, north to east; in North Carolina, northerly; along the west Gulf coast, southeast; in Tennessee, northeast to northwest; and in Illinois and Missouri, southeast to southwest; over the Florida Peninsula, northeast to east; in the Rio Grande valley southeast; in the lake regions, southeast to southwest; in the extreme Northwest, north to west; in the Missouri valley and the northeastern slope of the Rocky Mountains, northwest, except at the more southern stations in the Missouri valley, southerly; on the southeastern slope of the Rocky Mountains, south to southeast; over the northern and middle plateau region, west to southwest; on the middle Pacific coast, northwest to southwest; and on the south Pacific coast, west to northwest.

HIGH WINDS (in miles per hour).

Maximum velocities of fifty miles, or more, per hour, other than those given in the table of miscellaneous meteorological data, were reported as follows: Atlantic City, N. J., 54, ne., 11th; Block Island, R. I., 58, ne., 9th; 60, ne., 11th; 52, ne., 12th; Fort Assinniboine, Mont., 50, nw., 2d; Mount Washington, N. H., 98, nw., 21st; 93, nw., 23d; 92, nw., 24th.

LOCAL STORMS.

Exclusive of the storm along the Atlantic coast from the 8th to 12th, inclusive, descriptions of which are given under "North Atlantic storms," severe storms were reported in Texas on the 1st, 2d, and 3d; in Dakota, 3d and 4th; in Wisconsin, 4th; in Arizona, 6th and 7th; in Indian Territory, 8th to 12th; in Texas, 10th and 11th; in Kansas and Minnesota, 14th; in Virginia, 16th; in Delaware and Pennsylvania, 16th and 17th; in Maine, 19th; in Florida, 20th to 22d; in Florida and Georgia, 23d; and in New Jersey, 25th. Exclusive of the storm period, 8th to 12th, on the Atlantic coast, severe storms were most frequently reported in Texas and Indian Territory, where they were noted on five dates; in Florida on four dates; in Dakota, Arizona, and Delaware on two dates; and in Wisconsin, Virginia, New Jersey, Kansas, Minnesota, Maine, and Georgia on one date.

WATER-SPOUTS.

Rochester, N. Y., 19th: at about 8 a. m. several waterspouts were reported to have been observed at Ontario Beach, near Charlotte, N. Y. Dark, threatening clouds hung low, while loud peals of thunder and flashes of lightning were observed. From the water rose a mass of mist about forty feet in diameter, from the center of which extended a funnel-shaped column about five feet in diameter at the base, and spreading out to a width of eight or ten feet at the top, where it reached the clouds, seemingly about one hundred feet above the surface of the lake. There was an off-shore breeze at the time, and the column moved rapidly in a southeasterly direction. Soon another similar column rose in the west, and the first one diminished in size and disappeared. In the meantime a third one appeared, the second one growing larger, and a fourth appeared between the others. The spouts were visible about twenty minutes, and when departing, seemed to break in the center, the upper part disappearing in the clouds.—*Rochester, N. Y., Union, September* 19.

INLAND NAVIGATION.

HIGH TIDES.

Exclusive of the high tides attending the storm off the Atlantic coast from the 8th to the 12th, high tides were reported as follows: Wood's Holl, Mass., 8th; Key West, Fla., 8th, 9th, 10th; New London, Conn., 9th; Cedar Keys, Fla., 23d; Eastport, Me., 27th.

FLOODS.

Dallas, Tex., 11th: reports from the northern, northeastern, and northwestern sections of this state show that the rains which have fallen in those districts during the past week have caused general damage to crops and property, and delayed traffic by flood. There is scarcely a railroad that is not obstructed by bridges being washed away, and some points have been cut off from outer communication for forty-eight hours. The damage to the cotton crop will be very large.—*Republic, Saint Louis, Mo., September* 12.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-points at the several